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ABSTRACT

This paper describes a range of programs (paper based, CD-ROM and online) developed by the New South Wales Department of Education and Training to address the unfolding technology literacy agenda. To illuminate the approach taken towards emerging literacies, the paper develops a metaphor around travel and the emergence of the horseless carriage. The paper also describes the Technology in Learning and Teaching (TILT) program which addresses the "teachers first" principle and provides a starting point and context for subsequent program development. The paper concludes with a millennium perspective of literacy and technology briefly looking back over the past millennium and forward towards the next. It concludes with the need to provide students with access to life's options which can only be gained through full participation in whatever are the literacies of the time. (Author/RS)

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One state's response to the technology literacy agenda
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ONE STATE'S RESPONSE TO THE TECHNOLOGY LITERACY AGENDA

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This paper describes a range of programs (paper based, CDROM and On-Line) developed by the NSW Department of Education and Training to address the unfolding technology literacy agenda. To illuminate the approach taken towards emerging literacies the paper develops a metaphor around travel and the emergence of the horseless carriage. The paper also describes the Technology in Learning and Teaching (*TILT*) program which addresses the 'teachers first' principle and provides a starting point and context for subsequent program development. The paper concludes with a millennium perspective of literacy and technology briefly looking back over the past millennium and forward towards the next. It concludes with the need to provide students with access to life's options which can only be gained through full participation in whatever are the literacies of the time.

Introduction

My dad is 93, his Uncle David had the first car in Hunmanby (our village in North East Yorkshire). It had the power of several horses and was open topped like the horse drawn carriages it was modelled on. Also like them it had high back to back seats so that the coachmen could ride shotgun. Its brake was mounted on the running board. As my dad tells it Uncle David climbed into the driver's seat and two of his workmen got into the back guarding the rear from the mob of children that followed them round the village. After two or three circuits Uncle David had had enough and called 'whoa' only to find that the thing didn't stop. He had to endure the obscenities of the men as they bailed out and the cheers of the villagers as he made yet another round of the main streets before the car finally ran out of petrol and came to a halt. But he wasn't short of hands to help push it triumphantly back to his house (Smith, 1992). My dad still laughs when he tells that story and we speculate on what Uncle David would make of the power, speed and design of today's cars. And how the skills of car driving have changed, as well as who can drive them. And the changes to society's infrastructure, mobility, dangers, employment; changes to family life and global power structures measured in steel, engineering, oil.....

The new technology of *car* brought with it new language and concepts, leaving behind the language and concepts of *carriage* with their accompanying connotations of a particular (slower) society and cultural groups isolated in their villages. But Uncle David didn't get it - this *car*. How could he? He was of the carriage generation. He jumped into this new kind of horseless carriage but he

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Joy Murray

didn't ever jump into a car. *Car* came later and gradually as each new generation of people interacting with each new generation of *car* defined it for themselves.

And so, it seems to me, it is with computer and information technologies and new literacies. Like Uncle David we are defining concepts in terms of what we know now: books on wheels; dictionaries with running boards, walking in front of the Internet with a red flag and riding shotgun on the e-mail coach; reading, writing, listening and looking in a newfangled car. And the kids running along side are the ones who will define this car when it finally sloughs off its ties with current literacy practices because it will be their car and they will appropriate and invent the language to define it out of their shared life experiences.

But again like Uncle David we want to be in there driving now, with colleagues pushing the possibilities along. Because it's exciting, we're having fun and whenever we find that 'whoa' doesn't work we'll improvise, we'll ask around and find out what does, we'll learn something new. This is why we have a whole range of horseless carriages on offer, some closer to cars than others. But then there's a whole range of needs out there. And we're definitely going to be in the right place to help the process along, with teachers and students influencing and being influenced by the unfolding drama of life in the age of computer and information technologies.

Of Horseless Carriages and Cars

So what are these horseless carriages and cars designed to carry us some way along the technological highway? Before I talk about the ways in which we have addressed the technology literacy agenda in NSW I must mention the Technology in Learning and Teaching (*TILT*) program because it provides a starting point and context for subsequent program development. And in the spirit of the metaphor a colleague suggests it also makes ready the road for horseless carriages and cars[1].

TILT

The Technology in Learning and Teaching (*TILT*) program was developed in 1995/6 in response to a State Labor Government promise to provide training in the classroom use of computer and information technology for teachers who were not already using technology in the classroom. It was part of an overall whole of government strategy to upgrade technological infrastructure and make the increasing use of computer and information technology a priority. In particular *TILT* was part of the government's Computers in Schools Program (CISP) which included: providing all schools with an Internet machine and if necessary an additional telephone line; linking all schools to the Internet;

[1] My thanks to Bronwyn Stafford who read and commented on the draft paper.

providing advice to teachers on the use of computer and information technology in the primary school classroom and in each secondary school learning area; the rollout of computers to schools; and the creation of a Department web site to include online curriculum based activities for students as well as information (and eventually training programs) for teachers. Following Labor's success in the 1999 NSW state election the Computers in Schools Program is being expanded. Over the next four years a further 10000[2] teachers will be trained in *TILT* and 15000 teachers will receive training in a wide range of programs to be collectively known as *TILT* Plus (the technology literacy programs described below fit under this umbrella).

TILT is a 30 hour (one semester) program designed to accommodate the needs of teachers Kindergarten to Year 12 and across all subject areas[3]. Its six workshop components deal with: word processing; the internet and email; using a digital camera and manipulating images; databases; software; and multimedia. The final component, multimedia, allows participants to use the skills built throughout the program to construct a multimedia text.

Participants are supported by a trained facilitator who conducts workshops and on whom they may call during their three days of relief time. During the relief time teachers may follow up their learning in whatever way suits their particular needs and level of expertise.

Feedback indicates that *TILT* has been well received by teachers. For example 97% of respondents to the 1997 participant evaluation affirmed the high quality of their *TILT* facilitator. In Semester 1, 1998, 91% of survey respondents were completely satisfied with the delivery of the program; 87% were satisfied with the follow up activities and support; 92% of respondents indicated that *TILT* had been successful in assisting them to meet their professional needs in computer technology. Sixty six per cent of respondents indicated that as a result of having participated in *TILT* they did things differently in administration and 74% 'did things differently in the classroom'.

The vast majority of all respondents throughout the seven semesters of the current program (1996 - mid 1999) reported an increased confidence and a growing use of computer and information technology both for professional and classroom purposes. Some of their comments follow.

> "Excellent support. Facilitator very patient and knowledgeable. Always willing to help and always made himself available to assist with our questions and

[2] Between 1995 and 1999 15500 teachers were trained in *TILT*. This is approximately one third of every school's full time equivalent teaching service staff.
[3] For a full description of the program see Murray (in press).

> computer work." PE/Photography teacher, non-metropolitan secondary school,1996.
>
> "The materials were outstanding. Great to have them to look back to. The videos were marvellous. A couple of them I watched more than once." Teacher, metropolitan primary school, 1997.
>
> "The support was very good. We were able to access the *TILT* facilitator's time for consultation, demonstration, etc as required using days from the *TILT* relief. Activities were completed by all participants in our particular group and shared (very beneficial!)." Executive teacher, metropolitan primary school,1997.
>
> "This course has been one of the best and most enjoyable I've ever been to. A whole new world has opened up and I am endeavouring to provide the same enlightenment for my student." K-2 teacher, country school, 1998.
>
> "Overcome a real reluctance to use a computer and now feel confident to tackle computer based problems. feel able to implement classroom units as required in curriculum." Head-teacher Mathematics, country high school, 1999.

In addressing the 'teachers first principle' (Bigum, Durrant, Green, Honan, Lankshear, Morgan, Murray, Snyder, & Wild, 1997) *TILT* has prepared the way for other programs, in particular technology literacy programs.

Technology Literacy Programs 1995-1999

At the same time as *TILT* was being developed (1995 - 1996) the state received National Professional Development Program (NPDP) funding to develop a range of programs to address the use of information and computer technology in teaching and learning. Some of this funding was used for cross sectoral programs (NSW Department of School Education; NSW Catholic Education Commission; NSW Association of Independent Schools) such as the program developed to introduce parents to classroom uses of technology[4] and a program to address the issue of values in technology and learning (VITAL[5]). Some of the funding was used by individual school sectors. The Department of School Education used NPDP funding to complement the work already begun in *TILT*. The 30 hour TILT program was only a beginning, important areas like new literacies were not able to be covered. NPDP provided the perfect opportunity to investigate the role of critical literacy and the use of information skills in the context of multimedia and internet texts. The NSW Department of School Education (DSE) (now the Department of Education and Training (DET)) developed an NPDP program to address these areas. Was this to be our first horseless carriage?

[4] NSW Association of Independent Schools, NSW Catholic Education Commission & NSW Department of School Education (1997) *Supporting Learning Through Technology: A parent package*.
[5] NSW Association of Independent Schools, NSW Catholic Education Commission & NSW Department of School Education (1997) Values in Technology and Learning (www.vital.nsw.edu.au)

Making the Net Returns Worthwhile[6] (MNRW) was produced in 1996 as a self-paced program for individuals or groups. It was produced as a booklet[7] and referred participants to the internet in order to complete activities. *Making the Net Returns Worthwhile* focuses on the use of the internet as an information resource in the school context. It presents a process for teaching students how to identify and use information form the internet to complete learning tasks. The program has been written as a self-directed tutorial containing information, practical activities and opportunities for reflection and collegial discussion.

Making the Net Returns Worthwhile was structured around the NSW DSE publication *Information Skills in the school* (1989) which offered a framework for defining a research task, locating information, collecting and synthesising information and constructing and evaluating a new text. *MNRW* also included an article on critical literacy by Luke, O'Brien and Comber (1994) and suggested ways of applying the questions of critical literacy to internet texts. It was extremely popular with teachers. Groups of *TILT* graduates used it as a way of following up their learning, the DSE ran one day courses throughout NSW and requests for the publication came from interstate and overseas. Our horseless carriage was on the right track.

Two new programs developed out of *Making the Net Returns Worthwhile (MNRW)*. One was a CDROM *New Technologies New Literacies*[8] developed by a cross sector team using NPDP funding. The other was a series of programs called *Net Returns On-Line (NRO-L)* developed by the Department of Education and Training[9]. Was this our first Model T (although it did come in a range of colours)?

Unlike *Making the Net Returns Worthwhile Net Returns On-Line* is an internet based program. Teachers who enrol in the course gain access to the *Net Returns On-Line* website[10] and also receive a copy of the self-paced program *Making the Net Returns Worthwhile* & the booklet *Information Skills in the school*.

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[6] Written for the Dept of School Education by Hazel Vickers with cartoons by Mark David.
[7] It was envisaged as a booklet and CDROM, however the booklet alone became extremely popular with teachers during the pilot phase and there were technical difficulties in producing a CDROM which would do the things we wanted it to do. We therefore issued the booklet as a stand alone module. With the following year's NPDP funding we began work on a cross sectoral project to produce the CDROM incorporating into it the whole school development perspective addressed by the Association of Independent Schools. The technical difficulties were gradually overcome over the following 3 years.
[8] Text written by Hazel Vickers, production and instructional design Eleanor Igoe.
[9] Adapted for the internet by Georgia Phillips.
[10] *Net Returns On-Line* runs within the Top Class program which provides a course administration structure and framework to support participant learning, including facilities such as a bulletin board, discussion area and access to the online tutor.

Like *MNRW* the program, for teachers K-12, is aimed at developing information literacy skills in an internet environment. Participants are also asked to interrogate internet texts using the questions of critical literacy. *Net Returns On-Line (Science)* uses examples from the Secondary Science curriculum and *Net Returns On-Line (Careers)* uses sites relevant to Careers teachers. In addition to relevant classroom applications of computer and information technology the programs also encourage accessing and using the internet for professional development purposes. However, an important aspect of the new programs deals with developing effective search strategies and an understanding of web addresses, page construction and links (including the politics of links (Burbules, 1997).

It is interesting to note that what began as a simple task to transfer the original program to an online environment proved far from simple. The medium itself forced changes. The language changed to fit into the new space (for example research was indicating that people are reluctant to scroll down, so important points needed to fit into one screen). The kinds of activities suitable for a group of colleagues meeting together were no longer appropriate. Instead activities which made use of the online medium itself had to be devised. Another factor that implied its own set of changes was the software environment in which the program was constructed. It had facilities for participants to submit work to the online tutor and receive comments. It had facilities to calculate the percentage of the program accessed by each participant and the 'marks' gained on quizzes and 'assignments'. It had an hierarchical access structure so that the administrator had access rights that were not available to the tutor and tutors had access rights not available to participants. Contrast this with a booklet issued to all members of a collegial group who worked through the suggested activities together. Attempting to translate from a paper medium to online was our first real jolt of understanding of McLuhan's famous line 'the medium is the message', our first flash of recognition that this new technology brought with it a new kind of literacy constructed in new social cultural and political contexts (reading the research and coming face to face with the reality are two different things). The program's success is a tribute to the online tutors whose sense of humour shines through their online communications and whose ability to build a community of learners across time and space is wonderful to watch.

The *Net Returns On-Line* trial program was conducted in Semester 2, 1998 with 92 participants in 44 schools targeting the teacher librarian and a nominated learning partner in each school. Participants were organised into three classes of primary school teachers and one class of secondary Science teachers each with an online tutor. The programs (including *Net Returns (Careers)*) were

offered statewide in semester 1, 1999[11]. All three programs were well received by participants. Some of their comments follow.

> "Having to think about the steps in the information skills process did make me realise what I sometimes must put my students through when I set a task. It has made me think more clearly about how I will go about devising work for them in the future, especially if it incorporates the internet."
> Secondary teacher

> "As newcomers to web use and searching we found this task very overwhelming, but pressed on and achieved results slowly – and certainly learnt lots! We realised as we progressed, that the unit which had seemed so complex was guiding us through refining our search and getting us to try a variety of search engines."
> Primary teacher

> "Critical literacy skills focus was also extremely helpful. The case study was revealing."
> Primary teacher

> I really can't believe how valuable this course has proved to be especially the exercise in planning a unit of work finally it has all come together and I feel as though I am on the road to becoming or rather having a technological aspect to my teaching.... my appetite has been wetted! I feel much more confident and happy to pursue further study.
> Teacher, country High School

Net Returns On-Line enabled participants to access course material and participate in activities such as trying out search strategies and communicating with colleagues and tutor all from within the online course framework. There was no longer any need to read the course material in a book and then find a machine and internet link in order to engage in the activities. In the majority of classes this generated a high level of discussion among participants as they tried out the activities and shared online their successes and (sometimes heroic) failures. For better or worse our Model T was picking up speed.

However something was still missing from *MNRW* and *NRO-L*. We had not yet constructed an environment in which participants were able to take the final steps in our information skills process. They so far had not been able to construct and evaluate their own multimedia texts. Our second generation car was about to be born....

The *New Technologies, New Literacies* CDROM builds on the DSE NPDP project *Making the Net Returns Worthwhile* and incorporates the whole school perspective of the 1996 Association of Independent Schools' NPDP project which

[11] A *Net Returns On-Line* program for parents is currently being developed.

also looked at the application of critical literacy and information skills to electronic texts. It allows participants to practise their search strategies in a simulated internet environment and provides sound, text and graphic resources and a process for the creation of multimedia texts. It allows participants to evaluate the multimedia texts they have created applying information skills and a critical literacy approach to the understanding of how texts work. It supports collaborative work between teacher librarian and classroom teacher.

Early trials of the CDROM indicate that it will be received with enthusiasm by teachers. All who have explored it have provided valuable and positive feedback. It seems it is just what many have been waiting for.

The CDROM along with the programs described above are all part of *TILT* Plus (1999 - 2003) which provides the infrastructure in which teachers are able to access them. In addition they can be accessed by school leaders through the NSW DET Leadership Strategy (a recognition that horseless carriages may soon need power steering.....).

Leadership Strategy

In the Preparation for Leadership Program that is part of the DET Leadership Strategy participants undertake a series of eight hour modules chosen from a large range of materials prepared within the DET and by university personnel. A number of these address the area of information and computer technology, and in the context of school leadership direct participants towards the programs outlined above. *Preparing for Quality Leadership in Technology* is a module which provides sample technology skills audits and a framework to assist schools in planning for the needs of staff training in the area of new technologies. *Identifying and Building Computer Technology Skills, Knowledge and Understanding in the Whole School Community* asks participants to locate and become familiar with the Parent Package; VITAL; *Computing Quickstart*[12]; *Making the Net Returns Worthwhile*; and *Using the Internet* (for School Support and Administrative Staff). Participants are asked to present one of these programs to parents or colleagues. *Continuity in Learning with Computer and Information Technology* provides samples of schools' attempts to map the scope and sequence of computer and information technology related skills across the school and between primary and high schools addressing the issue of continuity identified in *Digital Rhetorics* (Bigum, Durrant, Green, Honan, Lankshear, Morgan, Murray, Snyder, & Wild, 1997). It requires participants to convene a group to investigate local issues of continuity and report on their investigations to a staff meeting with recommendations for action. *Developing*

[12] Cross sectoral NPDP package aimed at providing basic computer concepts to absolute beginners (used as a pre-*TILT* program for any participant who expresses a need for it).

Information Literacy Skills Across the School points participants to the *Net Returns* series and the CDROM *New Technologies, New Literacies.* It suggests participants familiarise themselves with the programs and introduce them to colleagues at a staff meeting with a view to participation by staff members.

Over the next four years it is envisaged that all schools will have access to one or more of the above programs according to school and teacher need. Our aim is for all students to have access to computer and information technologies supported by teachers who have a knowledge of, skills in, curiosity about and a framework for questioning new ways of interacting with the world made possible by new technologies - students and teachers together constructing and defining what it is to be literate in the year 2000.

So Much for Current Models of Carriages and Cars but What's the Millennium Perspective?

In the late sixteenth century Francis Bacon said that our hope for a better future lay in science. Three hundred years later geneticist JBS Haldane wrote "there is no hope save in science..... Physics and chemistry have made us rich, biology healthy, and the application of scientific thought to ethics ..... has done more than a dozen saints to make us good. The process can only continue if science[13] continues" (quoted in Wertheim, 1997:161). So what of science and technology? Will their future development make us good? Will we share ideas on ethics in a spiritual world as well as a scientific one as Davies and Hawking take up Einstein's search for God in the Theory of Everything? Will the essential questions of good, beauty and truth remain with us for the next millennium as they have stayed with us for this one throughout all of its scientific and technological upheavals?

Or is it possible for science and technology not to continue? In the 1960s McLuhan (1964:79) wrote that the 'power of technology to create its own world of demand is not independent of technology being first an extension of our own bodies and senses.' In accepting new technologies he says, 'we've surrendered our central nervous systems to private manipulation.' How much more does this apply today in the era of wearable technology and the even less visible (potentially gene manipulating) nanotechnology, not to mention virtual reality which some see as the way to immortality. With an annual doubling of speed and power and a halving of size some see machines not only repairing but creating and recreating themselves in the near future. Not only that but with nanocomputers fast approaching quark size, able to be inserted into a cell nucleus, we will see the emergence of a more subtle technohuman hybrid than the present pacemaker reliant, cochlear implanted, hipjoint repaired version of

[13] I think that 'science' can be read as 'science and technology'.

human-machine being. And then the Lamarckians and the Darwinians will have a field day proving and disproving the inheritance of acquired gadgetry.

Was McLuhan right? Have we surrendered? Or is it more like a coevolution of technology and living things? The technology of lenses extended the possibilities of our eyes, bicycles extended the possibilities of our legs and the technology of money made it possible to store the energy of our labour for a rainy day. I don't think there is a choice to be made about the continuation of science and technology. We are our technologies. The choice is to go on talking about and fighting for the things we passionately believe in because our conversations are as much a part of the environment in which evolution takes place as our natural and constructed surroundings. Indeed it is out of our conversations conducted in a myriad forms and media that the particular world we inhabit comes to be. What more central place is there for literacy and how could it ever be extricated from the technology we surrender it to, that holds it, shapes it, specifies it and is in turn shaped and specified in an eternal dance of reciprocity?

So will we become better communicators as we coevolve with our email, Internet and their progeny. At the moment there are equity issues involved in access to this kind of technology but this will change as more of the world's economy is reliant on global communication. The players will not want to lose such a huge potential market as the poor (for commerce or propaganda purposes). And then as we stand in the middle of the field, shopping centre or desert with our wearable mobile phone communicating with our wearable computer raiding the world's information stores, how long will it be before we can throw away the plastic and metal and perform brain to brain and brain to machine information dumps. The constructivists and the positivists will have a whole new and fruitful field for debate. What is knowledge? How do you get it? What constitutes wisdom and how do you become wise? But these are old questions. Like truth and beauty they have been with us through changing modes of communication for all of the current millennium and beyond. Maybe it is the questions that will survive the next millennium unchanged despite the technology and if it is then we can all have faith in humanity.

Throughout this address are threaded the twin strands of human and technology. Jaynes (1976) suggests that internal narration was the first technology – that voice inside the head which must have emerged at some stage in our evolution and is now taken for granted as the nature and consequence of consciousness. McLuhan suggests it was speech. Others cite extensions to human possibilities outside of the human body such as fire and the wheel. Whatever the technology it seems from a millennia perspective that we and our technologies co-evolve in mutual dependence. And the literacy theorisers of the

future will understand in the scheme of things the rise of the dominance of print for fulfilling our need to record our history-culture-and-knowledge-of-everything (and how, in so doing, we constructed a particular history, culture and knowledge). And from where they sit they'll see its gradual fall as other ways of constructing and recording reality emerge and become common place. Just as we can smile indulgently at the multimedia text of the Bayeux Tapestry and with the arrogance of our Age, as we embroider our internet texts, assume that literacy has come a long way since then. So too will our techno-hybrid descendants look back at our quaint (and of course sometimes very beautiful if limited) ways of recording and reciting who we are and why we're here and theorise about how our literacy practices came to construct this particular 'we' and this particular 'here'.

From such a perspective we can see also that different knowledge has counted at different times – philosophy, mathematics, religion and science have all taken the stage. In all ages there have been ways of inducting the young into the group's particular culture and passing on the means of survival – whether it has been sitting next to Nelly, sitting at the feet of the master or sitting in front of the telly – somehow we have muddled through defining and redefining what it is to be a literate person. This is encouraging. It bodes well for the next one thousand years and suggests to the optimist in me that our descendants (hybrid or otherwise) may look back to here and point to the issues we have in common and the familiar questions we are asking - like today's questions around technology and literacy. The most important thing is to keep on asking.

But it's time to return the car that we borrowed from Uncle David for our jaunt along the unfolding technological highway. How will we thank him? What gift could we take him from now - this man who could sing by heart any hymn in the Methodist Hymn Book and recite the best part of the Bible as he drove the country byways? Would he thank us for our idea of literacy or would he consider much of it to be noise? He lived a long and satisfying life. He had a strong sense of community and a responsibility towards others. Within the bounds of his beliefs he felt in control of his life (except for the occasional technological hitch). This is his gift to us. We can give him nothing better in return than a promise to never give up wanting and striving for these things for all or the thousands of students in our care. To achieve this we need to provide students with access to life's options, access that can only be gained through full participation in whatever are the literacies of the time.

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